Space Weather Forecast

Issued on Wednesday, 12 July 2023 at 01:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor Storm likely, chance of G2/Moderate Storm on 13 July with CME arrival. Chance of R1/R2 Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with a Moderate-class flare peaking at 11/1808 UTC, from a newly emerging sunspot region on the northeast limb. However, this region is currently difficult to analyse due to its close proximity to the northeast limb and the foreshortening effect. A second Moderate-class flare, originating from a large sunspot region in the southeast, peaked at 11/2215 UTC and produced an R2 Radio Blackout. Awaiting imagery for any potential Coronal Mass Ejection (CME) from this event, which given its location, could consist of an Earth-directed component.

There are currently twelve active regions on the visible disc. A region in the northwest is the most magnetically complex region. The largest region is in the southeast, as a large unipolar spot. A region near north centre disc continues to evolve, but doesn't have any obvious significant complexity at the moment. Most of the remaining regions appear to be small and simple at present.

A partial halo Coronal Mass Ejection (CME) associated with the 10 July Moderate-class flare was seen travelling towards the southwest in coronagraph imagery and an Earth directed component is considered probable as detailed below.

A filament eruption (arc of plasma), appears to have lifted off around 11/1900UTC, near a large sunspot in the southeast, which produced a CME seen in imagery, with the bulk of the material appearing to be heading southwards. This is yet to be analysed for any potential Earth-directed component.

Solar Wind / Geomagnetic Activity: The solar wind was at slow levels throughout and varied between 320-360 km/s. Total magnetic field strength has been weak to moderate throughout, whilst the north-south component was weak. Geomagnetic activity has been at Quiet levels throughout (Kp 1-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed, although levels of energetic particles were raised slightly above the normal background level as a result of recent moderate class flares.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate solar activity is most likely through the period, with a slight chance of an isolated Strong flare.

Solar Wind / Geomagnetic Activity: A partial halo CME associated with the Moderate-class

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flare early on 10 July was seen travelling towards the southwest in coronagraph imagery. An Earth directed shock component is considered probable. At this stage, an arrival time of around 13/0600 UTC is most likely, but confidence is rather low.

The solar wind is currently at slow levels and is likely to remain that way until the CME arrival. As the CME effects continue, a coronal hole fast wind is likely to arrive during Day 2 (13 July). The combination of CME effects and fast wind could lead to increased geomagnetic impacts.
Geomagnetic activity is forecast to be Quiet at first, becoming Active to Minor Storm with a chance of Moderate Storm intervals due to CME and fast wind effects on Day 2 (13 July), then probably returning to Unsettled by Days 3 and 4 (14-15 July).

Energetic Particles / Solar Radiation: Solar radiation has a slight chance of reaching the S1/Minor Storm threshold through the period, should a larger flare occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	20	5
Strong	G3	No	1	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	10	10	10	10

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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